

**WHAT WE CLAIM ARE:**

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*a,* Claim 1. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining at least one bore within its body which is angularly oriented with respect to a plane across its mating face and opens on said mating face, each bore being axially aligned with an angularly oriented bore defined in the body of an adjacent bone member and a threaded fastener member mounted in said axially aligned bores and extending across said mating face threadably engaging at least one of said bone members to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 2. A compound bone device made from bone tissue as claimed in Claim 1 wherein each bone member has a body which defines at least two angularly positioned bores which are axially aligned with the angularly positioned bores of an adjacent bone member, said bores being orientated at an oblique angle to a plane of each engaged mating surface and intersecting the plane of the mating surface and a threaded fastener member is mounted in each of the aligned bores.

Claim 3. A compound bone device made from bone tissue as claimed in Claim 1 wherein said threaded fastener member is a screw.

Claim 4. A compound bone device made from bone tissue as claimed in Claim 1 wherein said threaded fastener member is a threaded bolt.

Claim 5. A compound bone device made from bone tissue as claimed in Claim 1 wherein said threaded fastener member is a threaded rod.

Claim 6. A compound bone device made from bone tissue as claimed in Claim 1 wherein said threaded fastener member is a threaded rod with at least one nut member.

Claim 7. A compound bone device made from bone tissue as claimed in Claim 1 wherein said threaded fastener member is a threaded bolt with an associated nut member.

Claim 8. A compound bone device made from bone tissue as claimed in Claim 1 wherein one of the mating faces defines a plurality of bar members substantially parallel to the longitudinal axis of bone members and a plurality of bar members oriented transverse to the axis of the parallel bar members.

Claim 9. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining at least one throughgoing bore within its body which opens on said mating face and has a stepped countersink portion at its opposite end, each bore being axially aligned with an angularly oriented bore defined in the body of the other bone member and a threaded fastener member mounted in said axially aligned bores extending across said mating face to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 10. A compound bone device made from bone tissue as claimed in Claim 9 wherein said threaded fastener member is a bolt and nut assembly.

Claim 11. A compound bone device made from bone tissue as claimed in Claim 9 wherein said threaded fastener member is a threaded rod with at least one nut member.

Claim 12. A compound bone device made from bone tissue as claimed in Claim 9 wherein each bone member has a body which defines at least two angularly positioned bores which are axially aligned with the angularly positioned bores of an adjacent bone member, said bores being orientated at an oblique angle to a plane of each engaged mating surface and intersecting the plane of the mating surface and a threaded fastener member is mounted in each of the aligned bores.

Claim 13. A sterile composite bone assembly made from allograft bone tissue comprising a plurality of at least three bone members, each bone member comprising a body defining an exterior surface and at least one mating face defining a plurality of spaced projections which interlock and fit within spaces formed between the projections of a mating face of another bone member and at least one threaded member mounted in a bore formed in a body of each bone member extending at an angle across the interlocked mating faces with said at least one threaded member extending past the mating faces but not extending past the exterior surface of the bone member body.

Claim 14. A compound bone device made from bone tissue as claimed in Claim 13 wherein said threaded fastener member is a bolt.

Claim 15. A compound bone device made from bone tissue as claimed in Claim 13 wherein said threaded fastener member is a threaded rod.

Claim 16. A sterile composite allograft bone assembly for implantation into a surgical site comprising a shaped base block of cancellous bone and a plurality of cortical bone members, each of which is provided with at least one surface complimentary to a configuration of an outer wall of said shaped base block mounted to an outer wall of said cancellous bone block, each cortical bone member being secured to said base block of cancellous bone.

Claim 17. A sterile composite allograft bone assembly as claimed in Claim 16 wherein each cortical bone member is secured to said base block of cancellous bone by threaded fastener means.

Claim 18. A sterile composite allograft bone assembly as claimed in Claim 16 wherein each cortical bone member is secured to said base block of cancellous bone by rods with an interference fit.

Claim 19. A sterile composite allograft bone assembly as claimed in Claim 16 wherein each cortical bone member is secured to said base block of cancellous bone by an adhesive.

Claim 20. A sterile composite allograft bone assembly as claimed in Claim 16 wherein each cortical bone member is secured to said base block of cancellous bone by cortical bone rods with a demineralized outer layer and a mineralized base core.

Claim 21. A sterile composite allograft bone assembly as claimed in Claim 16 wherein each cortical bone member has a plurality of throughgoing apertures allowing fluid access to said cancellous bone block..

Claim 22. A compound allograft bone assembly for implantation into a surgical site as claimed in claim 16 wherein said base block of cancellous bone is rectangular in shape and each of said cortical bone members has at least one planar surface which is secured to a wall of said cancellous bone block.

Claim 23. A sterile composite allograft bone assembly for implantation into a surgical site comprising a substantially U shaped cortical bone support member with a base member and two leg members engaging said base member and extending away from said base member and a center block of cancellous bone shaped to fit within the legs of the U shaped base of cortical bone, said center block of cancellous bone being secured to said U shaped base of cortical bone.

Claim 24. A sterile composite allograft bone assembly as claimed in Claim 23 wherein each cortical bone member is secured to said base block of cancellous bone by threaded fastener means.

Claim 25. A sterile composite allograft bone assembly as claimed in Claim 23 wherein each cortical bone member is secured to said base block of cancellous bone by rods with an interference fit.

Claim 26. A sterile composite allograft bone assembly as claimed in Claim 23 wherein each cortical bone member is secured to said base block of cancellous bone by an adhesive.

Claim 27. A sterile composite allograft bone assembly as claimed in Claim 23 wherein each cortical bone member is secured to said base block of cancellous bone by cortical bone rods with a demineralized outer layer and a mineralized base core.

Claim 28. A sterile composite allograft bone assembly as claimed in Claim 23

wherein said U shaped cortical bone support member has a plurality of throughgoing apertures allowing fluid access to said center block of cancellous bone.

Claim 29. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a bore within its body which is angularly oriented with respect to a plane across its mating face and opens on said mating face, each bore being axially aligned with an angularly oriented bore defined in the body of the other bone member and a cortical bone rod member having a partially demineralized outer surface mounted in said axially aligned bores extending across said mating face in an interference fit to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 30. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load

in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a bore within its body which opens on said mating face, each bore being axially aligned with a similarly oriented bore defined in the body of the other bone member and a cortical bone rod member having a partially demineralized outer surface mounted in said axially aligned bores extending across said mating face in an interference fit to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 31. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a bore within its body which is angularly oriented with respect to a plane across its mating face and opens on said mating face, each bore being axially aligned with an angularly oriented bore defined in the body of the other bone member and a cortical bone rod member with a knurled outer surface mounted in said axially aligned bores extending across said mating face in an interference fit to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 32. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a bore within its body which is angularly oriented with respect to a plane across its mating face and opens on said mating face, each bore being axially aligned with an angularly oriented bore defined in the body of the other bone member and a wedge nail with an angular cross section press fit in said axially aligned bores and extending across said mating face in an interference fit to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 33. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which

prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a bore within its body which opens on said mating face, each bore being axially aligned with a similarly oriented bore defined in the body of the other bone member and a wedge nail with an angular cross section press fit in said axially aligned bores and extending across said mating face in an interference fit to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 34. A compound bone device made from sterile bone tissue for implantation into a surgical site which supports an anatomical load applied to the compound bone device during a post-operative period while the implanted bone tissue is being resorbed and remodeled, comprising:

a first bone member defining a first mating face constructed and arranged to support a load in a direction that is normal to the first mating face and to receive and engage a complimentary mating face of a second bone member;

a second bone member defining a second mating face that is complimentary to the first mating face of the first bone member constructed and arranged to support a load in the direction normal to the second mating face, said mating faces being mounted to each other so that the first and second bone members form a compound bone device which prevents displacement of the first bone member with respect to the second bone member in both a longitudinal direction and a transverse direction when an anatomical load is applied;

each bone member defining a throughgoing bore within its body which opens on said mating face, each bore being axially aligned with a similarly positioned bore defined in the body of the other bone member and a rivet member mounted in said axially aligned bores extending across said mating face to hold the first and second bone members in engagement resisting separation of the first and second bone members.

Claim 35. A compound bone device made from sterile bone tissue as claimed in claim 33 wherein said rivet member is constructed of a bioabsorbable plastic.

Claim 36. A compound bone device made from sterile bone tissue as claimed in claim 33 including adhesive material on at least one mating face of a bone member.



Claim 37. A sterile composite bone assembly made from a plurality of pieces of preshaped cortical bone tissue comprising a plurality of shaped bone members, each of which is provided with at least one mating face comprising a plurality of spaced projections forming a pattern which interlocks and fits within spaces formed between the projections of a mating face formed in a complimentary inverse pattern on another adjacent bone member, one of said shaped bone members defining an end member which extends away from said mating face beyond an end surface of the other shaped bone member and is positioned adjacent to and engages said end surface of the other shaped bone member to allow driving force to be applied thereto, mechanical fastener means engaging at least two of said shaped bone members to hold them together with the ends of the mechanical fastener member being inserted in said shaped bone members so that the ends do not extend past the outer surface of the shaped bone members.